

CLAIMS

WHAT IS CLAIMED IS:

1. A tool comprising:
a drill bit having a proximal end and a distal end, the distal end configured to cut bone;
a housing having proximal and distal ends and a bore configured to slidably receive the drill bit, the second end associated with a bone portion,
an adjustable depth stop assembly having proximal and distal ends and a bore configured to slidably receive the drill bit, the depth stop further having a portion configured to selectively lock the drill bit to the bore;
wherein when the drill bit is locked to the adjustable depth stop the proximal end of the housing is located a first axial distance from the distal end of the adjustable depth stop, the first axial distance proportional to a maximum drilling depth into the bone portion.
2. The tool of **claim 1**, the distal end of the housing further configured to engage the bone portion.
3. The tool of **claim 1**, the distal end of the housing further configured to engage a bone fixation element.
4. The tool of **claim 3**, wherein the bone fixation element comprises a bone plate or a pedicle screw clamping element.
5. The tool of **claim 3**, wherein the bone fixation element comprises a bone plate and the distal end of the housing is configured to engage a fastener hole of the plate.
6. The tool of **claim 5**, the distal end of the housing further comprising threads configured to engage corresponding threads of the fastener hole.

7. The tool of **claim 1**, the distal end of the housing further configured to engage a screw hole of a bone plate to fix the trajectory of the drill bit with respect to the bone plate and the bone portion.
8. The tool of **claim 1**, wherein the drill bit is axially positionable with respect to the housing, the drill bit further having an extended position in which the distal end of the drill bit extends distally beyond the housing distal end.
9. The tool of **claim 8**, the drill bit further having a retracted position in which the distal end of the drill bit does not extend distally beyond the housing distal end.
10. The tool of **claim 9**, the housing further comprising a spring having a first surface associated with the housing and a second surface associated with the drill bit, the spring operable to bias the drill in the retracted position.
11. The tool of **claim 8**, the drill bit further comprising an axial engagement portion configured to engage a corresponding axial engagement portion of the housing to prevent the distal end of the drill bit from moving axially past the proximal end of the housing.
12. The tool of **claim 11**, wherein the axial engagement portions of the drill bit and housing comprise a pin and a shoulder, respectively.
13. The tool of **claim 1**, the housing further comprising a proximal housing and a distal housing, the proximal housing portion comprising a spring operable to bias the drill in the retracted position, the distal housing portion comprising threads for engaging a bone screw hole of the a bone plate.
14. The tool of **claim 13**, the proximal end of the distal housing further comprising protrusion and recess elements configured to engage a respective recess and protrusion elements on the distal end of the proximal housing to rotationally fix the two housing portions.

15. The tool of **claim 13**, the housing further comprising a retainer for removably coupling the proximal and distal housing portions, wherein the housing portions may be disassembled to facilitate cleaning and/or sterilization of the tool.
16. The tool of **claim 13**, the proximal housing portion further comprising a proximal end having an increased diameter to allow gripping by a user.
17. The tool of **claim 13**, the proximal housing portion further having a proximal stop surface configured to engage the adjustable depth stop assembly.
18. The tool of **claim 1**, the adjustable depth stop further comprises an adjustment sleeve configured to slidably engage the drill bit, and a shuttle member adapted to be slidable with respect to the adjustment sleeve between a first position in which the adjustable depth stop is axially locked to the drill bit and a second position in which the adjustable depth stop is axially movable with respect to the drill bit.
19. The tool of **claim 18**, wherein moving the shuttle between first and second positions comprises moving the shuttle along an axis substantially perpendicular to the longitudinal axis of the drill bit.
20. The tool of **claim 18**, wherein moving the shuttle between first and second positions comprises moving the shuttle along an axis substantially non-parallel to the longitudinal axis of the drill bit.
21. The tool of **claim 18**, the shuttle further comprising a drill bit engaging surface, the drill bit further comprising a shuttle engaging surface.
22. The tool of **claim 21**, wherein one of the drill bit engaging surface and shuttle engaging surface comprises a projection and the other comprises a recess.
23. The tool of **claim 18**, the adjustable depth stop further comprising a locking sleeve associated with the adjustment sleeve, the locking sleeve co-operable with the shuttle to move the shuttle between the first and second positions.

24. The tool of **claim 23**, the locking sleeve and shuttle further comprising corresponding tapered sliding surfaces each of which forms an oblique angle with respect to the longitudinal axis of the drill bit, wherein axial movement of the locking sleeve moves the shuttle between the first and second positions.
25. The tool of **claim 21**, wherein the shuttle is axially fixed to the adjustment sleeve, the locking sleeve is axially translatable along the adjustment sleeve, and wherein moving the locking sleeve along the adjustment sleeve in a first direction causes the shuttle to move toward the first position.
26. The tool of **claim 25**, wherein moving the locking sleeve along the adjustment sleeve in a second direction causes the shuttle to move toward the second position.
27. The tool of **claim 18**, the adjustable depth stop further comprising a spring associated with the adjustment sleeve to bias the shuttle in the first position.
28. The tool of **claim 18**, the adjustment sleeve having a distal stop surface configured to engage a proximal stop surface of the housing.
29. A tool comprising:
- a drill bit having proximal and distal ends and a longitudinal axis, the proximal end configured to connect to a driving attachment and the distal end having a cutting surface for cutting bone, the drill bit further having an extended position corresponding to a first drilling depth into bone,
 - a housing comprising proximal and distal ends and a longitudinal bore, the drill bit axially positionable within the bore, the proximal end further having a stop surface, the distal end associated with a bone portion,
 - an adjustable depth stop assembly having proximal and distal ends and a longitudinal bore, the drill bit selectively axially lockable within the bore, the distal end comprising a stop surface configured to engage the housing stop surface, the

assembly further having unlocked and locked configurations, the drill bit axially translatable within the assembly when the assembly is in the unlocked position, the drill bit axially fixed with respect to the assembly when the assembly is in the locked configuration;

wherein adjusting the distance between the respective stop surfaces of the housing and the depth stop assembly adjusts the first drilling depth into the bone portion.

30. The tool of **claim 29**, the distal end of the housing further configured to engage the bone portion.

31. The tool of **claim 29**, the distal end of the housing further configured to engage a bone engaging element.

32. The tool of **claim 31**, wherein the bone engaging element comprises a bone plate or a pedicle screw clamping element.

33. The tool of **claim 32**, wherein the bone engaging element is a bone plate and the distal end of the housing is configured to engage a fastener hole of the plate.

34. The tool of **claim 33**, the distal end of the housing comprising threads configured to engage corresponding threads of the fastener hole.

35. The tool of **claim 29**, the distal end of the housing further configured to engage a fastener hole of a bone plate, the distal end comprising threads configured to engage corresponding threads of the hole in the plate.

36. The tool of **claim 29**, the distal end of the housing further configured to engage a fastener hole of a bone plate to fix the trajectory of the drill bit with respect to the bone plate.

37. The tool of **claim 29**, the drill bit further having a retracted position in which the distal end of the drill bit does not extend distally beyond the housing distal end.

38. The tool of **claim 29**, the housing further comprising a spring having a first surface associated with the housing and a second surface associated with the drill bit, the spring operable to bias the drill in the retracted position.
39. The tool of **claim 29**, the drill bit further comprising an axial engagement portion configured to engage a corresponding axial engagement portion of the housing to prevent the distal end of the drill bit from moving axially past the proximal end of the housing.
40. The tool of **claim 39**, wherein the axial engagement portions of the drill bit and housing comprise a pin and a shoulder, respectively.
41. The tool of **claim 29**, the housing further comprising a proximal housing and a distal housing, the proximal housing comprising a spring operable to bias the drill in the retracted position, the distal housing comprising threads for engaging a bone screw hole of the bone plate.
42. The tool of **claim 41**, the proximal end of the distal housing further comprising protrusion and recess elements configured to engage a respective recess and protrusion elements on the distal end of the proximal housing to rotationally fix the two housings.
43. The tool of **claim 41**, the housing further comprising a retainer for removably coupling the proximal and distal housings, wherein the proximal and distal housings can be decoupled to facilitate cleaning and/or sterilization of the tool.
44. The tool of **claim 41**, the proximal housing further comprising a proximal end having an increased diameter to allow gripping by a user.
45. The tool of **claim 41**, the proximal housing portion further having a proximal stop surface configured to engage the adjustable depth stop assembly.
46. The tool of **claim 29**, the adjustable depth stop further comprising an adjustment sleeve configured to slidably engage the drill bit, and a shuttle member adapted to be slidable with respect to the adjustment sleeve between a first position in which the adjustable depth

stop is axially locked to the drill bit and a second position in which the adjustable depth stop is axially movable with respect to the drill bit.

47. The tool of **claim 46**, wherein moving the shuttle between first and second positions comprises moving the shuttle along an axis substantially perpendicular to the longitudinal axis of the drill bit.

48. The tool of **claim 46**, wherein moving the shuttle between first and second positions comprises moving the shuttle along an axis substantially non-parallel to the longitudinal axis of the drill bit.

49. The tool of **claim 46**, the shuttle further comprising a drill bit engaging surface, the drill bit further comprising a shuttle engaging surface.

50. The tool of **claim 49**, wherein one of the drill bit engaging surface and shuttle engaging surface comprises a projection and the other comprises a recess.

51. The tool of **claim 46**, the adjustable depth stop further comprising a locking sleeve associated with the adjustment sleeve, the locking sleeve co-operable with the shuttle to move the shuttle between the first and second positions.

52. The tool of **claim 51**, the locking sleeve and shuttle further comprising corresponding tapered sliding surfaces each of which forms an oblique angle with respect to the longitudinal axis of the drill bit, wherein axial movement of the locking sleeve moves the shuttle between the first and second positions.

53. The tool of **claim 51**, wherein the shuttle is axially fixed to the adjustment sleeve, the locking sleeve is axially translatable along the adjustment sleeve, and wherein moving the locking sleeve along the adjustment sleeve in a first direction causes the shuttle to move toward the first position.

54. The tool of **claim 51** wherein moving the locking sleeve along the adjustment sleeve in a second direction causes the shuttle to move toward the second position.

55. The tool of **claim 46**, the adjustable depth stop further comprising a spring associated with the adjustment sleeve to bias the shuttle in the first position.

56. A method of drilling a hole to a desired depth, the method comprising:

- (a) providing a drill bit having a housing and an adjustable depth stop assembly,
the drill bit slidably receivable within a bore in the housing, the drill
bit receivable in, and adjustably lockable with respect to, a bore in the
depth stop assembly;
- (b) associating the housing with a bone segment;
- (c) adjusting the axial position of the depth stop assembly along the drill bit to
position the housing a first distance from the depth stop assembly; and
- (d) drilling a hole into the bone with the drill bit;

wherein the hole in the bone has a depth proportional to the first distance.

57. The method of **claim 56**, wherein the step of associating the housing with a bone segment further comprises engaging a distal end of the housing with the bone segment.

58. The method of **claim 56**, wherein the step of associating the housing with a bone segment further comprises engaging the housing with a fastener hole of a bone plate.

59. The method of **claim 58**, further comprising the step of fixing the trajectory of the drill bit with respect to the bone plate.

60. The method of **claim 58**, wherein the step of drilling a hole with the drill bit comprises moving the drill bit through the fastener hole.

61. The method of **claim 56**, the drill bit further comprising at least one depth marking, wherein step (c) further comprises selecting a drilling depth by sliding the adjustable depth stop assembly to a position adjacent the depth marking.

62. The method of **claim 56**, wherein step (c) is performed before step (b).